

**Before the
Federal Communications Commission
Washington, DC 20554**

In the Matter of)	
)	
Expanding Flexible Use in Mid-Band)	GN Docket No. 17-183
Spectrum Between 3.7 and 24 GHz)	

To: Secretary

REPLY COMMENTS

Pursuant to Section 1.415 of the Federal Communications Commission’s (“FCC” or “Commission”) rules, Hammer Fiber Optics Investments, Ltd. (“Hammer”), by its attorneys, hereby files these Reply Comments in the above-captioned proceeding.

I. BACKGROUND

A. Hammer Wireless® AIR

Hammer is a New Jersey-based internet service provider (“ISP”) and a wholly owned subsidiary of publicly traded Hammer Fiber Optic Holdings Corp. (OTCQB:HMMR).¹ Hammer recently launched its Hammer Wireless® AIR point-to-multipoint wireless system (“AIR System”). Hammer’s AIR System is an important technological development that helps further long-standing Commission goals. As explained below, it readily works in urban/suburban areas, increasing competition and offering consumer choice in broadband providers, as well as in unserved and underserved rural areas, helping bridge the digital divide.²

¹ Hammer offers commercial and residential services. As a commercial provider, Hammer offers business solutions that include fiber transit solutions, VoIP platforms, Ethernet connectivity and managed services in select markets across its New Jersey, Pennsylvania and New York network footprint. In addition, Hammer recently launched residential triple play service serving Atlantic City and surrounding communities.

² See, e.g., *In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services*, Fifteenth Report, 26 FCC Rcd 9664, ¶ 24 (2011) (discussing how changes in its rules for the 2.5 GHz band could “increase competition and consumer choice, make possible new services, and promote the availability of broadband for all Americans. . . [as well as] play an important role in extending broadband

The AIR System was designed from the ground up based on Multichannel Multipoint Distribution System (“MMDS”) architecture. The AIR System runs DOCSIS 3.0 (scalable to DOCSIS 3.1) and utilizes frequency division duplexing (“FDD”) for upstream and downstream, requiring two frequency bands for operation with 200 MHz spacing between upstream and downstream edge frequency. Deployment uses a base station with sector antennas designed for 90-degree coverage, typically placed as high as possible (*e.g.*, on a cell tower or atop a building) in a centralized location. Sectors can be placed next to each other, alternating polarization from horizontal to vertical to avoid interference with neighboring antennas to achieve up to a 360-degree coverage area. Currently, the AIR System requires line of sight to the customer’s premises, where a bi-directional transceiver is installed using a standard satellite dish.³ The transceiver is then connected to a cable modem or gateway via coaxial cable.⁴

1. The AIR System is Versatile.

Hammer’s AIR System technology is extremely versatile. It makes efficient use of spectrum – it can receive two separate incoming signals at the same time, which allows spectrum in different frequencies and channels to be processed by one transceiver. It is flexible – able to function across a wide range of frequencies between 4.9 GHz and 39 GHz and can bond individual, small non-contiguous channels into one contiguous 450 MHz wide channel.

service to rural and underserved areas. . . [and] enable . . . providers to use this spectrum in a more technologically and economically efficient manner”).

³ Hammer is in the advanced stages of refining the system to operate “under the canopy,” where line of sight would not be needed. Trials of this system are slated to commence in early 2018.

⁴ See Attachment A – Hammer Wireless AIR System – Overview at p. 1.

2. The AIR System is Scalable.

Hammer's AIR System is highly scalable due to its low cost and ease of installation. Network rollout costs less than \$600 per subscriber and deployment to approximately 2,500 homes (start-to-finish) takes less than 3 months.

3. The AIR System is Consumer-Friendly.

The AIR System's cable-ready architecture is consumer-friendly, making use of off-the-shelf customer premises equipment. Customers can access the Internet using standard DOCSIS 3.0 (scalable to DOCSIS 3.1) modems and VoIP service with their existing phones through a direction connection with a Hammer-provided ATA. Video can be viewed on a variety of WiFi-capable devices or set-top boxes within the home.

B. Hammer's AIR System is Designed for 5G Standards.

Hammer, which considers its deployed AIR System as a pre-5G architecture, is already working and testing compliance with what it assumes will be future 5G standards, including LTE compatible service over 500 MHz wide broadband channels to fixed LTE subscriber modems and LTE small cells utilizing mmWave or Ka/Ku band spectrum. The LTE component is already functional in internal laboratory testing. Several recent developments highlight Hammer's AIR System's versatility and potential for 5G service.

C. Hammer's Pre-5G Deployments

1. 28 GHz

Earlier this year, Hammer, through a leased spectrum arrangement using 28GHz downstream and 31GHz upstream frequencies, launched triple play service serving Atlantic City

and surrounding communities in New Jersey.⁵ With three towers, coverage is expected to reach roughly 90% of Absecon Island (about 35,000 homes passed), and Hammer averages two new installs daily. Customers report broadband speeds exceeding 300 Mbps downstream and 100+ Mbps upstream.

2. 12 GHz

Hammer recently partnered with Go Long Wireless, a Sarasota, Florida company that holds 12 GHz Multichannel Video Distribution and Data Service (“MVDDS”) spectrum in 49 markets. Hammer plans to introduce triple-play services targeting largely underserved rural areas, including tribal nations, throughout Go Long Wireless’s national footprint. Hammer’s first market will be Baltimore, Maryland, with launch of its services planned for early 2018.

While both these early endeavors employ pre-5G architecture, the FCC recently approved use of the 28 GHz band for 5G service,⁶ and has under consideration use of the MVDDS spectrum for 5G.⁷ Hammer, therefore, is in a prime position to help serve yet another FCC goal – rapid deployment of 5G service.⁸

⁵ Hammer selected the Atlantic City area to demonstrate the capability of its AIR System to succeed in an urban area served by incumbent broadband providers.

⁶ See *In the Matter of Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Report and Order, 31 FCC Rcd 8017, ¶ 19 (2016) (“*Spectrum Frontiers Order*”).

⁷ See Petition of MVDDS 5G Coalition for Rulemaking, RM-11768 (filed April 26, 2016) (Public Notice, Report No. 3042 (CGB May 9, 2016)) (“*12 GHz Band Petition*”).

⁸ See Statement of Tom Wheeler, Chairman, Federal Communications Commission, Before the Committee on Commerce, Science, and Transportation, United States Senate; Hearing on “Oversight of the Federal Communications Commission,” 2016 FCC LEXIS 790 (March 2, 2016) (noting that “spurring 5G innovation and deployment is one of the Commission’s highest priorities”).

II. HAMMER SUPPORTS MAKING MID-BAND SPECTRUM AVAILABLE FOR 5G SERVICE.

A. The FCC Should Make 12 GHz Available for 5G Service in a Timely Manner.

Hammer supports the efforts of the MVDDS 5G Coalition to “remove unnecessary regulatory constraints on the 12.2 – 12.7 GHz band . . . that prevent use of this spectrum for 5G wireless broadband services.”⁹ Whether by acting on the *12 GHz Band Petition*,¹⁰ or through this proceeding, timely action on approving use of the 12 GHz band for 5G service will allow Hammer (and others) to work towards realizing the FCC’s goal of “spurring 5G innovation and deployment.”

B. Hammer Supports a Wholesale Review of Spectrum Uses and Needs.

Part of the appeal of Hammer’s AIR System is its ability to work using a variety of frequencies. In addition to the 12 GHz MVDDS band, Hammer’s AIR System has been in research and development for use in several spectrum combinations that are part of the frequency bands under consideration in this proceeding to make available for 5G service. Hammer therefore supports expeditious Commission action to open mid-band spectrum frequencies for 5G uses.

T-Mobile makes an important observation when suggesting that the FCC conduct a “complete evaluation of use of the spectrum in the bands.”¹¹ It points out that the need for spectrum availability for certain technologies may no longer exist or have diminished, and Commission records may not reflect an accurate picture of spectrum use because of licensee

⁹ See *In the Matter of Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Comments of MVDDS 5G Coalition (Oct. 2, 2017) at 2.

¹⁰ See *12 GHz Band Petition*.

¹¹ See *In the Matter of Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Comments of T-Mobile (October 2, 2017) at 23 (“*T-Mobile Comments*”).

failure to cancel unused authorizations or “‘over-coordination’ of proposed use.”¹² Much like was done with the broadcast Incentive Auction, T-Mobile, suggests certain incumbent users may be able to relocate to comparable facilities without having to incur the costs of relocation themselves.¹³ In addition to those instances where the FCC can act now to make available certain frequencies for 5G deployment, Hammer believes that a holistic and thoughtful review of existing uses and users would be beneficial and encourages the FCC to undertake such additional steps.

C. Smaller 5G Providers Must Have a Meaningful Opportunity to Participate.

As the Commission looks to modernize spectrum allocation policies to facilitate deployment of 5G services, in mid-band spectrum frequencies or otherwise, the Commission must make sure that meaningful opportunities exist for smaller providers to participate. Consistent with past practice, the FCC should extend its spectrum leasing rules to new services,¹⁴ ensure meaningful opportunity for small businesses to participate under any service-specific competitive bidding procedures,¹⁵ and define smaller license areas, much like the FCC did in its *Spectrum Frontiers Order*,¹⁶ that will facilitate smaller providers’ access to, and reduce the potential for larger providers to warehouse, spectrum.¹⁷

¹² See *T-Mobile Comments* at 23-24.

¹³ See *id.* at 24.

¹⁴ See, e.g., *In the Matter of Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, Second Report and Order, Order on Reconsideration, and Second Further Notice of Proposed Rulemaking, 19 FCC Rcd 17503, ¶ 60 (2004) (extending spectrum leasing policies to the MVDDS services); see also *Spectrum Frontiers Order*, 31 FCC Rcd 8017 at ¶ 239.

¹⁵ See generally *In the Matter of Updating Part 1 Competitive Bidding Rules*, Report and Order, Order on Reconsideration of the First Report and Order, Third Order on Reconsideration of the Second Report and Order and Third Report and Order, 30 FCC Rcd 7493 (2015) (maintaining service-by-service approach for defining small business and bidding credits).

¹⁶ See *Spectrum Frontiers Order*, 31 FCC Rcd 8017 at ¶¶ 35-36 (adopting counties as the license area size for Upper Microwave Flexible Use Service in the 28 GHz band).

¹⁷ See *id.* at ¶ 34.

III. CONCLUSION

Hammer respectfully requests that the Commission move swiftly to eliminate barriers to deployment of 5G services in the mid-band spectrum frequencies. Hammer asks that the Commission act expeditiously, through favorable action on the *12 GHz Band Petition* or through this proceeding, to authorize use of the 12 GHz band for such services. In addition, Hammer encourages the FCC to take a holistic approach for reviewing the possibility of making other bands available for such use. Finally, Hammer asks that the Commission ensure smaller providers have a meaningful opportunity to participate in the deployment of 5G services.

VERIFICATION

I have read the foregoing Reply Comments, and to the best of my knowledge, information and belief, there is good ground to support them and they are not interposed for delay.

Respectfully submitted,



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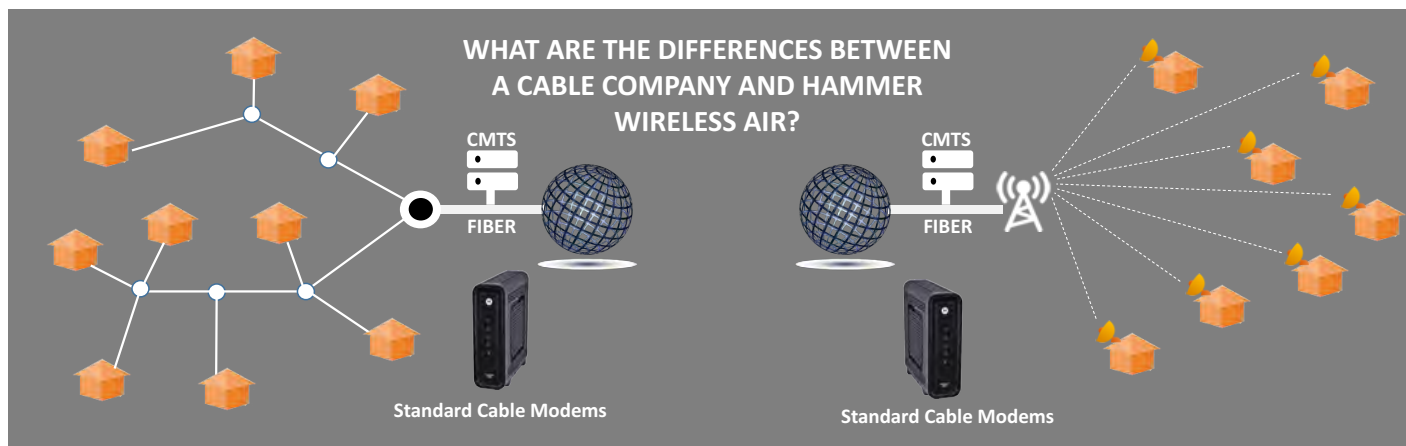
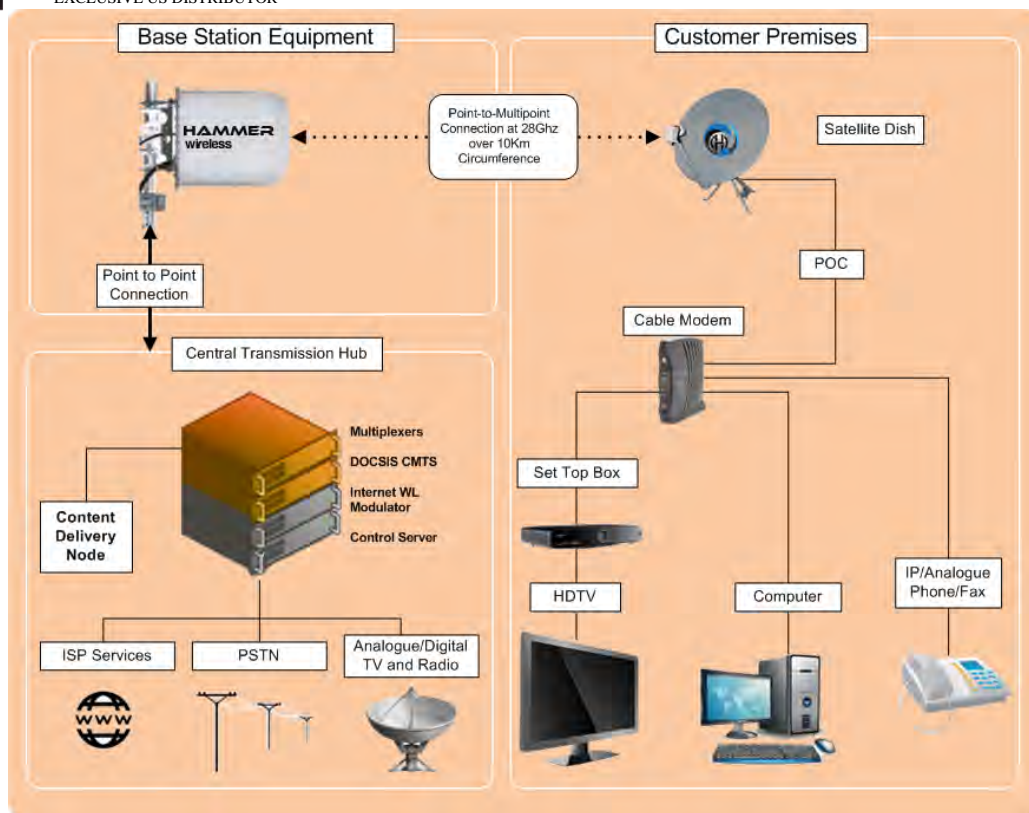
November 15, 2017

ATTACHMENT A

COMPANY OVERVIEW



EXCLUSIVE US DISTRIBUTOR



DESCRIPTION OF NETWORK	CABLE COMPANY	HAMMER WIRELESS
Maximum bandwidth over DOCSIS 3.0 modem	Up To 300 Mbps	Up To 300 Mbps
Cost of Network Roll Out	\$4,000 to \$6,000 per Sub	Less Than \$600 per Sub
Start to Finish 2,500 homes Deployed	18 months	3 months
Television Services Delivery	Set Top Box	Set Top Box
Television HD / 4K content / Telephone Service	YES	YES
DOCSIS 3.0 and 3.1 Compliant	YES	YES

Wireless.

Hammer Wireless AIR uses a proprietary distribution system designed from the ground up based on Multichannel Multipoint Distribution System (MMDS) architecture, which is currently making use of the LMDS spectrum. The system runs DOCSIS 3.0 (scalable to DOCSIS 3.1) and utilizes standard DVbX for video delivery. The system utilizes Frequency Division Duplexing (FDD) for upstream and downstream, requiring two frequency bands for operation with 200 MHz spacing between upstream and downstream edge frequency. Deployment uses a base station with sector antennas designed for 90-degree coverage, typically placed as high as possible (i.e. on a cell tower or atop a building) in a centralized location. Sectors can then be placed next to each other, alternating polarization from horizontal to vertical to avoid interference with neighboring antennas in order to achieve a greater arc of coverage, or even a 360-degree coverage area. The system requires line of sight to the premises where a transceiver is installed using a standard satellite dish. The transceiver is then connected to a cable modem or gateway via coaxial cable.

Unique Technology.

The Hammer Wireless Air patented technology is made up of two components – a base station radio for P2MP connections to Hammer Transceivers located at a customer's premises. Our technology includes the following features that makes it a truly unique distribution system and permits a wide range of uses.

EFFICIENT USE OF SPECTRUM

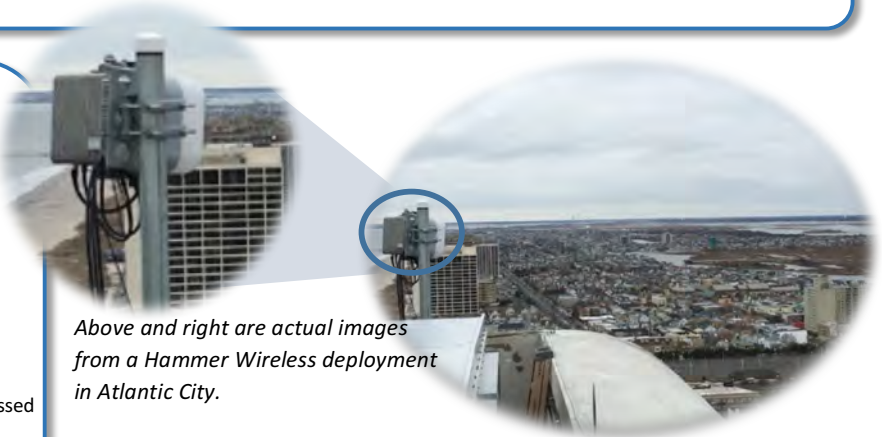
Can receive 2 separate incoming signals at the same time, which allows spectrum in different frequencies and channels to be processed in one transceiver.

WIDE RANGE OF FREQUENCIES

Can function across a wide range of frequencies between 6GHz and 39GHz.

CHANNEL BONDING CAPABILITY

Has the ability to bond individual, small non-contiguous channels into one contiguous 450MHz wide channel.



Above and right are actual images from a Hammer Wireless deployment in Atlantic City.

The Atlantic City Deployment.

Our wireless technology as has been deployed on Absecon Island, including Atlantic City, NJ. This deployment uses leased spectrum, 28Ghz for the downstream and 31 GHz for the upstream. With three towers, coverage is expected to reach roughly 90% of Absecon Island (about 35,000 homes passed).

The deployment has been successful, averaging two new installs daily, and customers are reporting 300+ Mbps downstream and 100+ Mbps upstream.

Frequency Allocations.

Hammer Wireless Air has been in R&D for use in the following spectrum combinations:

Downstream frequency range in GHz	Upstream frequency range in GHz
4.9 – 6.5	16.5 – 18.6
10.0 – 11.5	4.0 – 5.2
10.0 – 11.5	4.9 – 6.5
10.0 – 11.7	10.5 – 12.7
10.0 – 11.7	10.0 – 11.7
11.5 -12.7	4.9 – 6.5
11.5 – 12.7	4.9 – 6.5
11.7 – 12.7	10.0 – 10.8
11.5 – 12.7	4.9 – 6.5
12.6 – 13.5	4.9 – 6.5
12.7 – 14.8	10.0 – 11.0
24.0 – 25.0	26.0 – 27.0
16.0 – 24.0	26.0 – 28.0
26.0 – 29.0	30.0 – 32.0



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DECLARATION

1. I am the Chief Executive Officer of Hammer Fiber Optics Investments, Ltd. ("Hammer").
2. I have read the foregoing Reply Comments of Hammer and all factual information relating to Hammer is true and correct to the best of my knowledge, information and belief.

November 15, 2017



Mark Stogdill